

**Title:** Direct Injection of a Bacterial  
 Culture to Biodegrade MTBE-  
 Contaminated Groundwater  
 NCBC-38-99

**Lead PI/Affiliation:** UCD  
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 Initiated - 08/99  
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## Abstract:

A field study will be conducted at the NETTS Port Hueneme, to investigate the feasibility of using *in situ* bioaugmentation with a pure bacterial culture to reduce concentrations of methyl tertiary butyl ether (MTBE) in contaminated groundwater. The bacterial culture to be used in this project, designated PM1, was isolated by University of California at Davis (UCD) from a field-operated biofilter at the Joint Water Pollution Control Plant of the Los Angeles County Sanitation District.

PM1 is able to utilize MTBE as its sole carbon and energy source. In batch studies, initial linear rates of MTBE degradation by  $2 \times 10^6$  cells/ml PM1 were 0.07, 1.17, and 3.56  $\mu\text{g/ml/hour}$  for initial concentrations of 5, 50, and 500  $\mu\text{g/ml}$  MTBE respectively. When incubated with 20  $\mu\text{g/ml}$  uniformly labeled [ $^{14}\text{C}$ ] MTBE, strain PM1 converted 46% to  $^{14}\text{CO}_2$  and 19% to [ $^{14}\text{C}$ ] labeled cells within 120 hours.

The PM1 injection site is approximately 2,000 ft down gradient from the gasoline release site. The PM1 injection site will be prepared by NETTS staff and will become part of the NETTS infrastructure. Three test plots will be installed at the PM1 injection site including:

1. Test Plot B, PM1 culture injection with oxygen sparging.
2. Test Plot A, oxygen sparging only.
3. Test Plot C, air sparging only.

Each plot is 9 ft wide perpendicular to groundwater flow, by 4.5 ft long. In addition, 36 monitoring wells have been installed up and down gradient of each test plot to collect samples for determining background water chemistry, and changes to the water once passed through each plot. The separations between the PM1 injection plot and the oxygen-sparging, and the air sparging plots are sufficient to prevent cross-contamination.

The objective of this field study is to determine if a bacterial culture injected into groundwater can effectively degrade MTBE under field conditions. Also to be analyzed are the differences between an injected MTBE biodegrading culture to indigenous microorganisms that are given either oxygen or air as growth enhancements.

From late 1984 to early 1985, approximately 10,800 gallons of gasoline leaked from two storage tanks and piping under the Naval Exchange (NEX) gas station at the Naval Base Ventura County Port Hueneme Site (NBVC). Since 1985, the Navy has taken actions to prevent any further damage to the environment from the leaks. The MTBE remediation technologies demonstrated at NBVC Port Hueneme Site are part of the overall strategy in the NEX Plume Management plan for containment and control of the plume to prevent any further damage to the environment.

**Results/Conclusions:** On-going project.

**Publications:** None